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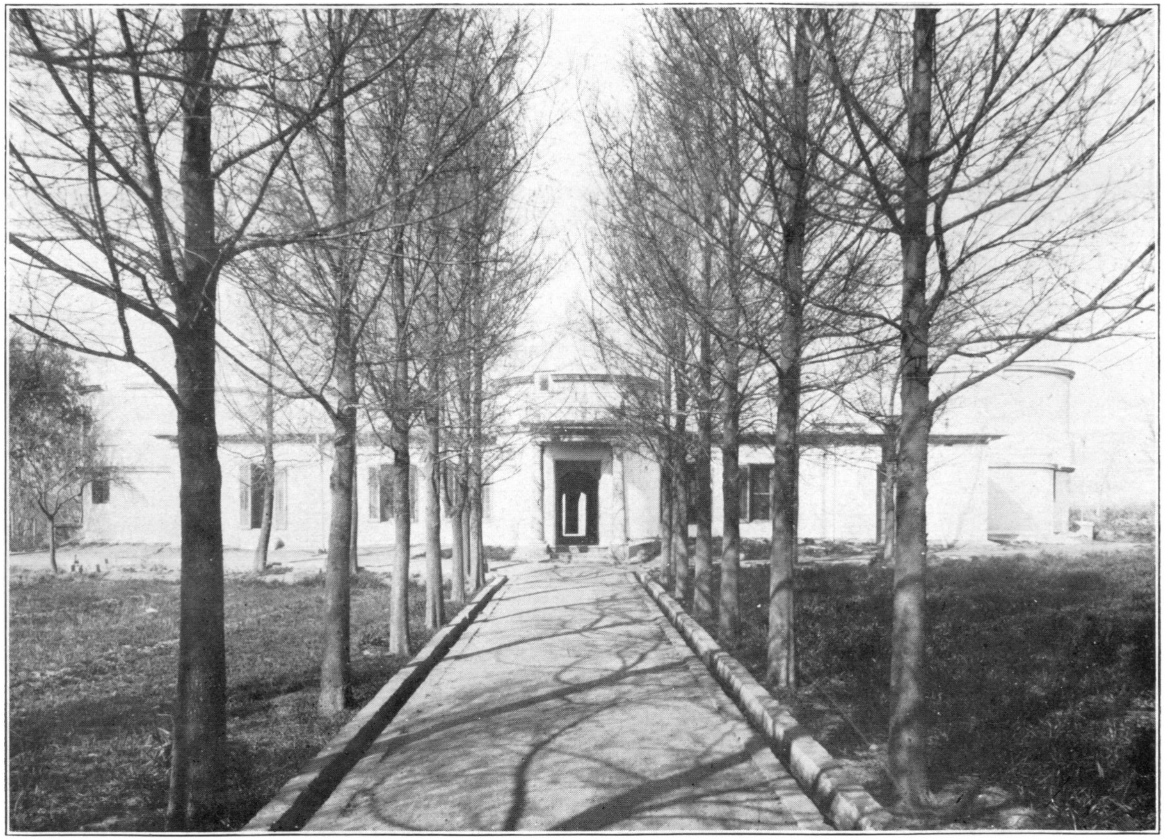


THE MAIN BUILDING OF THE OBSERVATORY AT CÓRDOBA.

PUBLICATIONS

OF THE

Astronomical Society of the Pacific.

VOL. XXII. SAN FRANCISCO, CALIFORNIA, DECEMBER, 1910 No. 134

THE NATIONAL OBSERVATORY OF THE ARGENTINE REPUBLIC.

By C. D. PERRINE.

As no general description of the Córdoba Observatory nor of the work in progress here has appeared for some years, I have thought that a short account of its activities will be of interest.

As is well known, the Córdoba Observatory, or more properly, the Argentine National Observatory, was founded in 1870 when Dr. BENJAMIN APTHORP GOULD brought a large equipment of instruments and built the observatory under the auspices of the Argentine Government.

LOCATION OF THE OBSERVATORY.

The observatory is situated on the bluffs overlooking the city of Córdoba, about one mile from its central plaza and some thirty meters higher. The Rio Primero, a small river which carries but little water in the dry season, flows through the city.

The observatory is 430 meters above sea-level.

The observatory is almost at the level of the great pampa which stretches away to the north, east, and south.

To the west rise the Sierras de Córdoba, a range of granite mountains, the nearest of which are some twenty to twenty-five kilometers away. The peaks of the nearest of the range are from twelve to thirteen hundred meters in height. In these mountains is situated the water storage system which supplies Córdoba with electric current and the surrounding country with irrigation. It is said to be the second finest reservoir site in the world. These mountains contain some very picturesque scenery.

To the south and farther away rises a peculiar mountain formation, a long ridge part of which is nearly level on top.

This Pampa de Achala is some sixty-five kilometers in length and about eight in breadth and has an altitude of about two thousand meters. At the north end are the Gigantes, which have an altitude of 2,300 meters. At the south end rise the peaks of Champaqui to altitudes of nearly 2,900 meters. The top of this pampa is covered with a fine carpet of grass. The sides are very precipitous, especially that to the west.

BUILDINGS.

The original buildings comprised the main observatory building, the residence of the director to the east, and the assistants' residence to the west.

The observatory building originally contained four medium-sized rooms, two domes (east and west of the rooms with which they were connected by small passages), and two small domes, over the north and south entrances.

In the passage near the east dome is placed the old meridian circle.

The west dome formerly held the 12-inch equatorial. When the new Warner and Swasey mounting was installed, this instrument was removed to the east dome.

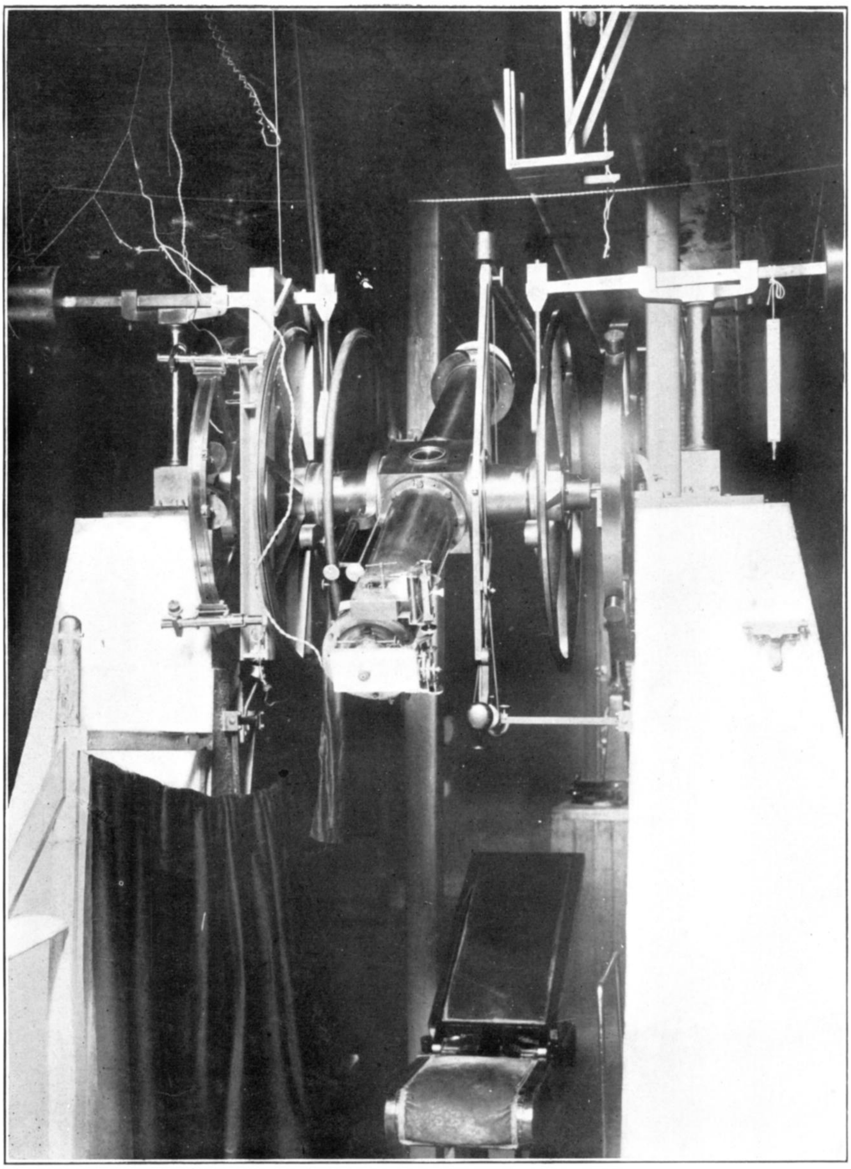
The 5-inch Clark equatorial was placed in the small dome over the north entrance.

The main building was subsequently enlarged by extending the meridian circle room to the full width of the building and by adding two rooms to the west.

There have also been added two small buildings to the south. One of these contains one large room used for the measuring department for the astrographic plates, and a basement containing the photographic dark-room.

The other small building to the south contains rooms for the janitor and for storage of supplies.

The building for the new meridian circle has been built to the south also and in the same meridian as that of the old instrument.



THE MERIDIAN CIRCLE OF THE NATIONAL OBSERVATORY AT CÓRDOBA.

INSTRUMENTS.

The principal instruments of the observatory are the following:—

13-inch astrographic telescope, with 7½-inch visual guiding telescope. Optical parts by HENRY BROS.; mounting by GAUTIER.

11¾-inch equatorial. Objective by HENRY FITZ; mounting by WARNER & SWASEY.

There is also a photographic lens of same size by HENRY G. FITZ.

190$^{\text{mm}}$ meridian circle (new) by REPSOLD.

122$^{\text{mm}}$ meridian circle (old) by REPSOLD.

5-inch equatorial by ALVAN CLARK & SONS.

5-inch photographic equatorial. Portrait lens by BRASHEAR; mounting by SÆGMÜLLER.

5-inch comet seeker by STEINHEIL.

3-inch portable transit and zenith telescope by FAUTH & Co.

The observatory possesses two Riefler clocks, one of which is arranged for constant pressure and temperature.

Five measuring engines are in use in the measurement of astrographic plates.

A new 7-inch photographic telescope of the portrait-lens type is completed and will soon be received in Córdoba. This instrument will be used first in making a survey of the Milky Way and other interesting regions of the southern sky, and for cometary photography.

A machine-shop is being installed to enable the instruments to be kept at the highest efficiency and to provide for prompt construction of new apparatus.

It is not necessary to recount in detail the early work of the observatory, for all astronomers are familiar with the great Córdoba General Catalog, containing the positions and the magnitudes of 33,500 stars, and the Uranometria Argentina. It will be remembered that the latter work was undertaken and the observations secured in the interval during which the meridian circle was being prepared. These works occupied the first fifteen years of the energies of the new observatory.

Upon the completion of the work for the General Catalog, in

1885, Dr. GOULD retired from the directorship and returned to his home in the United States. He took with him a series of negatives of thirty-five southern star clusters, which were subsequently measured under his direction. The resulting positions of over nine thousand stars were embodied in a volume issued in 1897, very shortly after his death. The volume was practically complete at the time of his death.

Upon Dr. GOULD's retirement in 1885, his first assistant, Dr. JOHN M. THOME, was appointed director. Dr. THOME was one of the members of the first staff which came to Argentina with Dr. GOULD.

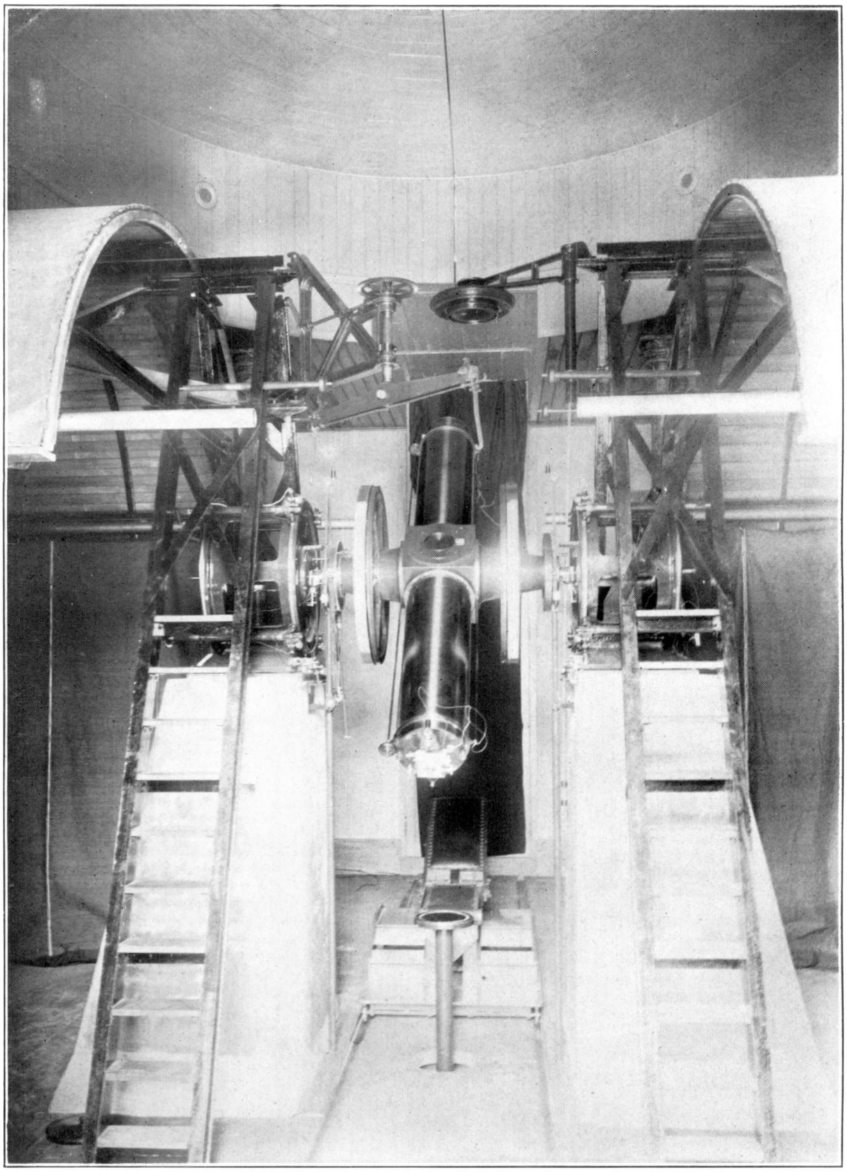
After the completion of the General Catalog, Dr. THOME began observations for his Durchmusterung. Three volumes of this work, containing 490,000 stars between — 22° and — 52°, have already been published. The observations for the zone — 52° to — 62° were nearly completed at the time of Dr. THOME's death in September, 1908. It is hoped to publish this volume soon, and to complete the work, including the maps, to the pole. Some observations have been made in the zone — 62° to — 72°.

In the years 1885-90, inclusive, the meridian circle work consisted of determinations of positions of stars scattered over the southern sky. These observations have been reduced and are being put in shape for early publication. A considerable number of stars observed in these years have proper motion.

In 1891 was begun the work of observing the stars of 9.2 magnitude and brighter, between the declinations — 22° and — 37°. These observations were completed in 1900. The reductions are complete. The revision is nearly completed when the results will be published in the form of a catalog for the epoch 1900.

In 1901 was begun the work of observing the stars to 9.0 magnitude in the zone — 23° to — 32°, for use in reducing the astrographic plates. About three fourths of the observations have been made.

At the Astrographic Conference of 1900 the zone — 23° 0′ to — 32° 0′ was placed in charge of the Argentine National Observatory. Some two years later the telescope was in position and the actual work of observing began.



THE NEW MERIDIAN CIRCLE OF THE NATIONAL OBSERVATORY AT CÓRDOBA.

The work of measurement is progressing rapidly and it is hoped to publish the first zone in about a year.

Thus far the chief energies have been devoted to the catalog work. Some difficulties have been encountered in making long exposures, which have delayed the chart work. These will be removed shortly, and the work of the chart will be pushed to completion along with the catalog.

Many comet observations have been made and published from time to time in the astronomical journals.

The observatory publications comprise nineteen quarto volumes and two atlases.

The new meridian circle has just been mounted and the preliminary try-out is in progress. All of the latest improvements are embodied in this instrument. The most notable are: The symmetrical steel tubes for the telescope; the overhead method of reversal, with pilot lights to guard against improper and insecure placing of lifting hooks; zenith mirror; heavy steel-frame system to support lifting crane and zenith mirror, with ladders giving easy access to overhead works; improved water-proof canopy cover for instrument; individual illumination of threads, micrometer heads, nadir and zenith mirror at eye-end; automatic rising nadir; improved system of counter-balancing; transit micrometer; provision for testing form of pivots, etc.

The details have been well worked out. The currents for lighting the eye-piece lamp and for the contact head are carried into the telescope by spring fingers at the axis and require no attention in reversing. The action of the counter-weights is likewise automatic and requires no attention in reversing.

Current for the small lights is obtained by stepping down the ordinary light current of 110 volts.

The illumination can be changed instantly at the eye-end from bright field to bright wire and the strength of the illumination varied by a small coal-resistance placed on the eye-end. The electric lamp is placed far enough away from the telescope-tube to prevent heating.

The mire may be observed by throwing a small lens into position between the eye-piece and the objective.

Double doors have been provided for the building for this instrument. For differential work the method of "refrigerating" the instrument will be used, by shutting in the cooler night air—rather than placing dependence entirely upon ventilation.

A study of the meteorological conditions leads me to believe that the region about Córdoba will be found unusually favorable for astronomical work with large telescopes. Observation shows that the nights at the observatory are practically all perfectly calm; that the air is very transparent, and that there is a large number of nights in the year suitable for observing.

It is a very rare occurrence at the observatory to have any night wind. Light winds often occur during the day, but unless a storm condition is present, die out at or before sunset. There is reported to be very little night wind up to altitudes of one thousand meters. At two thousand meters the night winds are also said to be light.

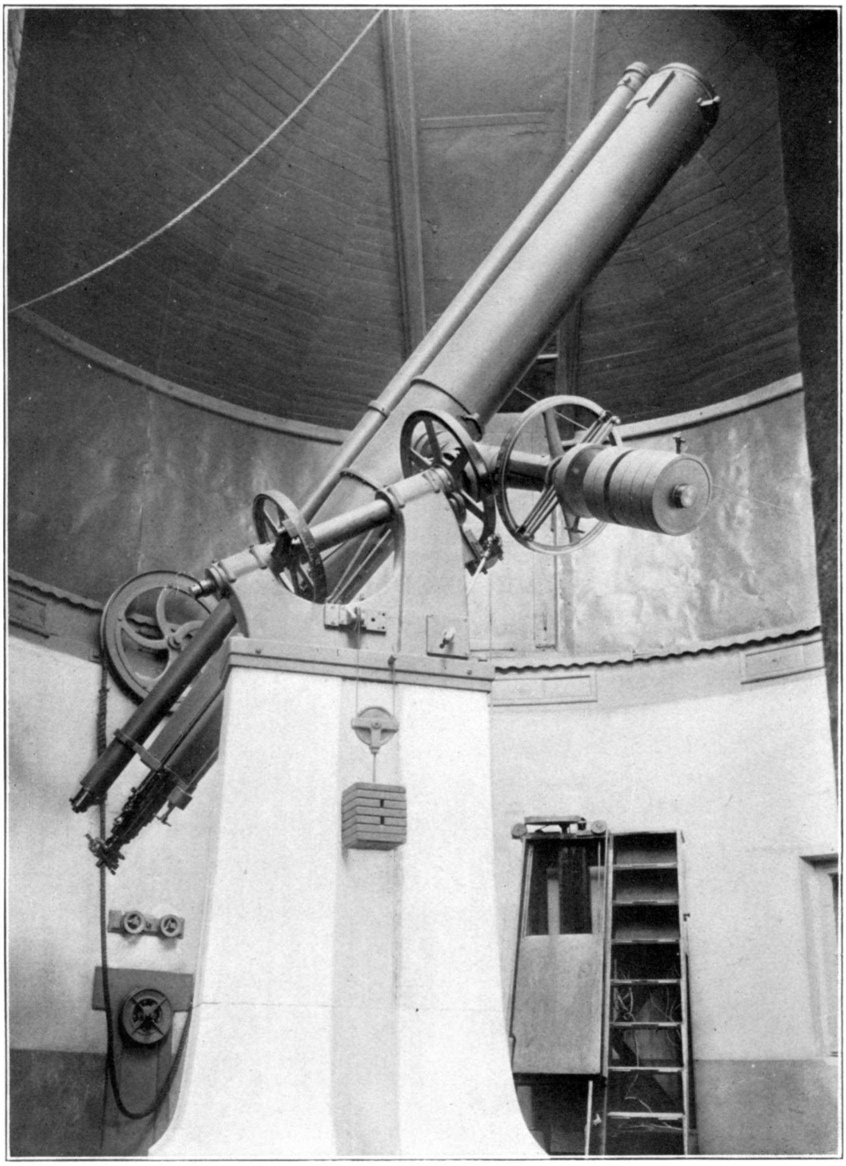
The storms are practically all of a tropical nature, sudden and soon over. In two hours after a heavy storm I have seen the sky perfectly clear and the star images steady.

Meteorologists have suspected that there is a "Fœhn" effect over the region about Córdoba. This would seem to be an almost ideal condition for fine seeing, because instead of the mixed masses of air which ordinarily exist, due principally to rising or horizontal currents, such a region should have a practically homogeneous atmosphere around it, brought down by descending currents from the great, uniform mass above. To obtain the full advantage of such a condition, the observer should be on a peak rising some distance, perhaps not over two thousand feet, into the air.

At all events, Córdoba is sufficiently near to the great tropical belt to warrant the belief that light night winds are to be encountered at sufficient altitudes to gain the full transparency of the atmosphere.

The air here at the observatory is remarkably clear to be at the level of the pampa and so near a large city. I have had unexpectedly good views of the Milky Way and Magellanic Clouds.

Not only is the air unusually transparent and tranquil, but there are also a large number of nights suitable for observa-



THE 11¾-INCH EQUATORIAL OF THE NATIONAL OBSERVATORY AT CÓRDOBA.

tion. Unlike most other stations, the distribution of observing nights is very uniform throughout the year; there is no long unfavorable season. There are slightly more clear nights in winter, which is the dry season, than in summer, usually. A sample of the observing conditions during the past year may be had in the case of Halley's Comet. From November 30, 1909, when the comet was first observed, until February 3, 1910, when it was discontinued until after passing the Sun, observations were secured on forty-six nights out of sixty-six, including losses because of the Moon. From April 17th, when observations were resumed, to July 10th photographic observations were secured on sixty-seven nights out of a possible eighty-five. This winter has been a little more favorable than usual perhaps, but from two hundred to two hundred and fifty nights may be counted upon in the average year.

It is planned to send an expedition into the Sierras the coming summer to secure some photographic observations, and to obtain further data to aid in the selection of the most suitable observing station for a large telescope.

The chief energies of the observatory for several years must be devoted to astrometry, in which it has a number of obligations. It is hoped, however, to devote a portion of our resources to some of the modern problems.

RÉSUMÉ OF OBSERVATIONS OF HALLEY'S COMET AT CÓRDOBA.

By C. D. Perrine.

Theoretically, Halley's Comet became bright enough to be seen with our 12-inch equatorial about the first of December, 1909. It was first looked for on November 30th and found to be much brighter than was expected. From this date until February 3d it was observed for position. Estimates of size and brightness were made also. Observations were secured on twenty-one nights in December, twenty-two in January, and two in February, or forty-six nights in all. Observations were discontinued after February 3d because the comet was then